

COMMENT RESOLUTION FORM

Return to: Allan Coutts (allan.coutts@wsms.com)

Comments Due: 12/14/2007

Document Title: Fire Analysis for DOE Nuclear Facilities		Document No. Not applicable		Revision: 0	Date: 11/29/2007
Reviewer: David Renfro	Date: 11/30/07	Response by: Allan Coutts	Date: 12/31/2007	Comments Resolved:	Date:

Item No.	Page/Section	Proposed Change	Comment Justification/Explanation	Response	Resolution
1	4/1.0/last sentence in first para	"Project and DSA/FHA development teams should consider implementing one of the four approaches in this guide when developing a DSA and FHA for a DOE nuclear facility."	Need to address both documents. "Shall" is too strong for a guide.	Current concept is to propose the document as a standard similar to DOE-STD-5506-2007. This document used the terms must and should. Shifting shall's to must's is editorial and will be done later as appropriate. If the document becomes a guide then shall's will need to be changed to should's. - No change for now. Will need to establish a committee consensus.	
2	24/4.4.1/first sentence of second para	Replace "failure" with "survival."	Appears that intent is that less capable walls also could be shown to survive.	Accept	

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3	70/3.2.2 and 72/3.3.1 and 3.3.2	Add strong caveat in all three of these sections that this is one possible approach that is being presented as an example and is not a requirement. Clarify that this approach is based on STD-5506 which only applies to TRU waste safety analysis and that it is not endorsed by STD-3009 which applies to all DOE HC-2/3 facilities.	For years, the use of the "stair step" approach has been unacceptable in some DOE circles and is not widely, uniformly used. The approach to selection of controls is more tailored and judgment-based at some sites and not so prescriptive as the method presented here.	Added to 3.2.3: "The risk ranking approach in this attachment has been adapted from DOE-STD-5506-2007. It is just one possible approach to accomplish risk ranking. Other risk ranking approaches have successfully been used within the DOE complex. Each Nuclear Facility project team and DSA development teams for existing Nuclear Facility should establish a systematic risk ranking approach that best fits the project or DSA update process."	

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4	86/4.2.1.5/fourth para	Revise the periodic reviews of the unloading operation by a FPE to a more specific, implementable control such as listing the types of vehicles that have been analyzed/bounded as acceptable in an unloading procedure used by operators. This procedure could also have the operator survey the area for other combustibles that might exceed the 500 pound limit introduced in the next paragraph.	The recommended periodic review is vague, not performed by the operators involved in the unloading, and not guaranteed to prevent the use of a vehicle that might exceed the analytical bounds.	Protecting fire loading assumptions is very difficult, especially with respect to vehicles. Delivery vehicles are typically not under the direct control of the facility. Rather they just arrive as part of a planned delivery. The specific vehicle can evolve with the fraction of combustibles is constantly increasing with each vehicle replacement, but not in a manner that would be recognized by an operator. The control approach recognizes that combustible creep might cause the analyzed level to be exceeded. This level of exceedance must be recognized as part of the acceptance of residual risk. Of significant importance is a recognition that the physical mass has a second order effect on the fire demand. Geometry and material of construction have a greater influence. Most general operators do not have the training to evaluate these factors. Thus, a control strategy that gets away from counting pounds mass is important to successful implementation.	

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5	87/4.2.2.2/ penultimate para	Verify that the recommendation to use 0.02 for the LPF is justified considering that the materials being credited are experiencing a 76-minute pool fire that exceeds the qualification rating of the Type B container.	Pool fire is 800C and MP for lead is 327C. Appears that fiberboard and HEPA filter material could also be severely damaged/displaced.	Will add the following justification, "In addition, pressurized releases in the range of 0.18 to 3.5 MPa (~500 psig) are considered to have a bounding ARF/RF of 1E-1/0.7. The median values for this event are 5E-2/0.4)." The sample problems will also be disseminated to SMEs. This review should identify if there is any concern about this value.	
6	All	Recommend careful editing of entire document.	Numerous (dozens) of typos/editorials still exist throughout document.	Accept	

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Reviewer: Michael L. Jones, FPE EMD LLNL	Response by: Allan Coutts	Date: 12/31/2007	Comments Resolved: Date:
14 December 2007			

Item No.	Page/Section	Proposed Change	Comment Justification/Explanation	Response	Resolution
1	3 of 89 Last Para. 2nd to last sentence	Question: Can this sentence be read to mean that at a single location a "Mix & Match" approach be used?		Yes, a hybrid would seem to be an alternative, but it would need to demonstrate how gaps are avoided. - No change required.	
2	7 of 89, Section 2.0 - Third para. Second bullet	After the first sentence add this wording: The FHA should also include basic fire protection information and evaluation of the building the fire areas are located in and the support systems, utilities, and programs that may be common to the various fire areas in the building. If these systems are in exposure buildings they should be reviewed also.	The loss or improper function of these systems could cause or increase the loss impact. It is possible that these could become involved in the spread of the fire or contamination to other areas or provide paths to the exterior.	The intent of the bullets is to capture the key items that define the overall scope of the FHA as succinctly as possible. The inclusion of descriptive information and evaluation in the FHA is necessary to fulfill the key items listed. Thus, adding the additional text will compromise the conciseness of the paragraph. The material in Figure 3 is intended to convey what is to be described and evaluated in an FHA, however the paper is not intended as a replacement for DOE Guide 420.1B-3, where such detail would be appropriate. - No change required.	

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3	7 of 89, Section 2.0 - Fourth para. Sub- para. 1	Add the following wording at the end of this sentence. "that could result from human error, upset of the process, equipment malfunction or from an exposure event.	This broadens the source information that can be used in the DSA. It better addresses and matches items 1 & 2 in the following paragraph.	The suggested change is to a sentence that paraphrases a requirement from DOE Order 420.1B. The wording goes beyond what is stated in the order, so the change would not be appropriate. - No change required.	
4	7 of 89, Section 2.0 - Fourth para. Sub- para. 5	Add "and equipment" after process controls.	In some cases the equipment is part of the barrier or safety system we are dependent on for loss control. An example would be secondary containment or molten material catch basins at furnaces.	The suggested change is to a sentence that paraphrases a requirement from DOE Order 420.1B. The wording goes beyond what is stated in the order, so the change would not be appropriate. - No change required.	

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Item No.	Page/Section	Proposed Change	Comment Justification/Explanation	Response	Resolution
5	9 of 89 Figure 3	<p>FHA ITEM LINE to DSA ITEM</p> <p>Description of High Value Property Dashed Describe the Facility</p> <p>Natural Hazards Impact on Fire Safety Dashed Evaluate Normal,...</p> <p>Natural Hazards Impact on Fire Safety Solid Evaluate Normal,...</p> <p>Natural Hazards Impact on Fire Safety Solid Natural Hazards</p> <p>Exposure Fire Potential and Dashed Describe the Facility</p> <p>Potential for a toxic Biological, Dashed Derive the Hazard Controls</p> <p>Fire Protection Dashed Describe the Facility</p> <p>Life Safety Considerations Dashed Derive the Hazard Controls</p>	<p>I think that these inputs should be established between the FHA and the DSA. The items are the first sentence of the item in each column and my suggestion of the type of input that should take place.</p>	<p>Updated Figure 3 and 4 to assure consistency Added dashed (- · -)</p> <p>Added dashed (- · -)</p> <p>Can't do dash and solid dashed seemed better (see previous)</p> <p>Can't find a Natural Hazard box under DSA item</p> <p>Added dashed (- - -)</p> <p>Added dashed (- - -)</p> <p>Left as solid since fire protection feature descriptions should be based on FHA. Added dashed (- - -)</p> <p>Accept in principle.</p>	
6	Page 10 of 89 Figure 4	<p>FHA CONTENTS LINE to DSA CONTENTS</p> <p>Description of High Value Property Dashed Chapter 2</p> <p>Natural Hazards Impact on Fire Safety Dashed Chapter 15</p>	<p>There is a need for the information from the FHA to be in the DSA and visa versa.</p>	<p>Added dashed lines (- · -) for both.</p> <p>Accept change.</p>	

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7	13 of 89, Goal (4)	Stakeholder Objective: Suggest raising the Limit for most fires from \$3M to at least \$5M.	A single medium to large glove box can run to 1\$M easily. If the support equipment and controls, damage to surrounding items in the room, and clean up are included this can very quickly result in a loss of >\$3M in property value.	The limit is established in DOE Guide 420.1-3. This is not the appropriate venue to initiate this change. - No change required.	
8	13 of 89, Goal (4)	"Example Performance Criteria" uses 3 hour walls. I suggest we word this to state "walls of sufficient construction and fire rating to prevent the spread of fire from the area of origin".	With control of the combustible loading and continuity or combustible breaks (Areas in a building with no combustible loading) we may be able to accept walls with a fire rating of 3 hours. A documented control program would have to be in place and functioning as part of this acceptance.	Changed first 3-hour entry to 2-hours. (2-hours is the minimum rating to establish a fire area.) Left second 3-hour entry related to MPFL > \$150 MM since the rating is stated in DOE-STD-1066-99. Moved reference to NFPA 221 to > \$150 MM criteria. - Accept in principle.	

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Item No.	Page/Section	Proposed Change	Comment Justification/Explanation	Response	Resolution
9	17 of 89, section 4.3 last para., last sentence.	This sentence states " If the fire demand approaches...". Recommend we reword this as follows; If the fuel loading in the area is 85% to 90% of the hour rating of the barrier walls action should be taken to reduce the fuel loading or the wall should be reinforced to the next higher hour rating.	"Approaches" may have a very broad range of meanings. By using the suggested wording we can provide a measurable level of guidance.	The use of "approaches" is used in the same manner as "challenges the evaluation guidelines." It is recognized as requiring interpretation, but considered necessary. The cited technical approach of using a fraction of the combustible mass in comparison to the fire barrier rating has little technical basis since it neglects ventilation and burning behavior. While the method has been used as a screening criterion for some projects and facilities, its use should not be proposed in the paper. (See http://www.fire.nist.gov/bfrlpubs/fire06/PDF/f06014.pdf) - No change required.	
10	36 to 41 of 89	The figures are remote from the write up.	For ease of use I suggest that the tables immediately follow the write up for that table.	Agree with concept and will attempt shifting material to keep figures and tables closer to first use. - Accept in principle.	

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Item No.	Page/Section	Proposed Change	Comment Justification/Explanation	Response	Resolution
11	37 of 89 Approach 2 and 3	Nuclear and Chemical Evaluations are included in the FHA write up. This is a very broad statement.	The FPE will require some input from other disciplines/sources. This could also have a very large impact on the MPFL from an off site or near site clean up, etc. Perhaps we should expand the wording and requirements on these two items.	<p>Many of the concerns related to these approaches are discussed in Table 7. As currently arranged, this is the location to capture such information. If additional concerns (or advantages) are proposed, they can be added.</p> <p>The paper does not suggest that the MPFL be calculated differently than previously required. If cleanup cost were not included in previous MPFL estimates a site-specific interpretation should be considered. - No change required.</p>	
12	52 of 89: Item 3.3.2.3.3	In the DOE-STD-3009-94 this item is worker safety. There should be input from the FHA.	We need to state that the input for this will only be related to fire hazards and exiting with only limited input for other hazards.	The proposed level of detail is beyond the current intent. If more detail is desired, the level of detail should be balanced through all of the topics. The intent of the table is to suggest that the DSA author read the applicable FHA section for input or coordination. The table is just a tool to help the DSA author. - No change required.	
13	52 of 89: Item 3.3.2.3.5	In the DOE-STD-3009-94 this item is Accident Selection. There should be input from the FHA.	As above this may be limited to one scenario for the MPFL. There could be other fire related accidents that do not qualify for the MPFL treatment. If these are desired for the DSA I would suggest that this be clearly stated in the FHA instructions or a separate list of these possible fire accidents.	The intent of the table is to suggest that the DSA author read the applicable FHA section for input or coordination. The table is just a tool to help the DSA author and the author is still required to follow the requirements in DOE-STD-3009-94. - No change required.	

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14	55 of 89 - Item 9.4	In the DOE-STD-3009-94 this item is Radioactive and Hazardous Waste Streams & Sources. There should be input from the FHA.	This can be addressed from the fire aspect. The details may be required from other sources such as a plume model. In some cases Waste Accumulation Areas server various buildings and may be remote from the building the FHA is being written for. We may need to provide additional instructions in the FHA to include WAA's that receive this type of material from the FHA building.	The proposed level of detail is beyond the current intent. If more detail is desired, the level of detail should be balanced through all of the topics. - No change required.	
15	55 of 89 - Item 11.4.5	In the DOE-STD-3009-94 this item is Fire Fighting Readiness Assurance. There should be input from the FHA.	What is the level of details that is required for this? This may require extensive reviews of the F.D. program and the response, training, and maintenance records. Would the Needs Assessment or the contract (if an outside department) be sufficient for this? Again the instructions for the FHA may need expansion.	DOE-STD-3009-94 establishes the required level of detail. The intent of the table is to suggest that the DSA author read the applicable FHA section for input or coordination. The table is just a tool to help the DSA author. It is not intended to provide the author with the requirements. - No change required.	

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Reviewer: M. K. Gupta	Date: 12/14/07	Response by: Allan Coutts	Date: 12/31/2007
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Item No.	Page/Section	Proposed Change	Comment Justification/Explanation	Response	Resolution
1	1/1st paragraph	Revise or delete the sentence.	It states that, While this guide is directed towards Hazard Category 2 and 3 facilities, the concepts may be used for ISA prepared for Hazard Category 1 facilities. According to 10CFR 830, Hazard Category 1 facilities also require a DSA.	ISA is the term used by the NRC, which is cited as providing the method for Category 1 DSAs. ISA will be changed to DSA.	
2	General	New nuclear facilities need to be addressed in this report.	This guide talks about "existing nuclear facilities." What about new nuclear facilities?	There are several places in the document that discuss existing nuclear facilities, but these are specific to existing facilities. In other locations the terminology used is " Nuclear Facility project teams and DSA development teams for existing Nuclear Facilities," which covers both new and existing facilities. - No change required.	
3	Figure 2	Add Draft DOE-STD-1189 as a requirement for DSA.	The Draft DOE-STD-1189 for DSA/PDSA is missing	DOE-STD-1189 is a draft document that is not publicly available. As such it should not be cited. - No change required.	

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4	Table 1, Nuclear Safety Program	Provide onsite criteria	The onsite performance criteria are missing.	<p>There are no established worker protection Evaluation Guidelines in DOE-STD-3009-94. The specific wording in the standard is "On-site Evaluation Guidelines are not required for adequate documentation n of a safety basis utilizing the overall process of this Standard." DOE-STD-1186-2004 states " Controls are classified ... by criteria described in DOE STD-3009 for safety significant SSCs for worker protection."</p> <p>To provide a value the following text will be added: "On-site: DOE-STD-3009-94 does not recommend a on-site value (DOE-STD-5506-2007[xx] recommends a value of 100 rem)"</p>	
5	Table 1, Fire Protection Program	Define time.	The time (i.e., "XX" in 2nd column)is not defined.	The intent of the XX was to explicitly not define a time, since this it typically facility-specific. The text states "where XX is customized for individual program" which is considered to adequately explain this. - No change required.	
6	Table 2	Delete "ingestion" from the table.	The "ingestion" of released hazardous material is not normally considered during consequences calculations.	Will delete "/ingestion" at each location where it occurs in the table. - Accept	

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7	15	Revise the AA bullet.	Accident Analysis Bullet - It states, "To simplify the analysis process, the postulated scenarios are grouped into the categories presented in Table 2. Common practice is to establish at least one DBA for each category." Normally no scenarios from E-4 and E-5 category are analyzed in AA.	The requirement in DOE-STD-3009-94 is "The identification of DBAs results from the hazard evaluation ranking of the complete spectrum of facility accidents." It may be that no E-4 or E-5 events required detailed AA calculations, however at least one from each category should be established as a DBA, if applicable. - No change required.	No change.
8	17/4.3	Revise BDBA section	The BDBA definitions are not clear. The section 3.4.3 of DOE-STD-3009 provides excellent definition of BDBA scenarios. Consider revising the BDBA definitions.	Accept in principle - Added material from "DOE-STD-3009-94: "Operational beyond DBAs are simply those operational accidents with more severe conditions or equipment failures than are estimated for the corresponding DBA."	
9	17/3	Revise "credible event" write-up.	The credible event definitions are not clear. WSRC procedure E-7, 2.2.5, Attachment 8.8 provides the definition of "credible events" for Internal Events. Consider revising the credible event definitions.	A review of the E-7 procedure indicates that the definitions don't fit fire definitions very well. The material was considered in the preparation of the current text. - No change required.	
10	Table 3	Revise the table 3 title.	The title of Table 1 and Table 3 are same.	The title of Table 3 has been changed to Comparison of Nuclear Safety and Fire Protection Evaluation Considerations.	
11	Table 3/E1.1 and E1.3	Revise table 3.	Under DSA Consideration: Revise "...automatic detention.." to "..automatic detection..".	Accept proposed changes.	

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12	Table 3	Revise table 3.	Worker group 1 and 2 not defined.	Added as a table note: "Worker group (WG) 1 is a worker in the room of origin; WG 2 is a worker inside the facility and WG 3 is outside the facility or in another facility."	
13	Table 3/E1.3	Revise table 3.	Under DSA Consideration: Revise "...evaluate the room.." to "...evacuate the room.."	Accept proposed changes.	
14	Table 3/E1.3	Revise table 3.	Under DSA Consideration: Revise "If the building ventilation system prevents release..." to "If the building ventilation system mitigates release..."	Accept proposed changes.	
15	Table 3/E1.4	Revise table 3.	FHA Consideration evaluates an MPFL scenario. DSA Consideration states that DSA should consider scenarios that bound FHA scenario, i.e., MPFL event. One of the goals of FHA and DSA integration was that DSA fire events be not as bounding as an MPFL event.	The implication that the DSA fire events will never be more bounding than the MPFL neglects the non-mechanistic definition of the MPFL. The likelihood of the MPFL can vary significantly from facility to facility. In some cases the MPFL might approach anticipated, while in others the MPFL will be in the EU frequency bin. - No change required.	
16	Table 3/E1.6	Revise table 3.	The Description of events 1.4 and 1.6 is same.	The description for 1.6 has been changed to " The requirement to consider this scenario is established in DOE G 420.1-3. The expectation is for a non-mechanistic evaluation, where the dollar loss is the replacement cost for the fire area plus all direct and indirect costs associated with the fire and clean-up operations.. Thus, the MPFL does not represent an FHA scenario."	

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17	Table 4	Revise table 4.	Worker distance or location should be from the release point to the environment and not from the facility boundary. What is the basis for using 640 meters?	Text changed to " Workers at 100 meters the from release point or facility boundary " The intent is to capture the range of how this is addressed at different sites.	
18	22/4.4	Revise the LOC discussion.	There is no tie of selection of multiple LOCs to (i.e., second or third) EGs. The multiple LOCs should be selected to ensure that mitigated consequences do not challenge EGs.	The suggestion to consider a second LOC, is principally for SC features that provide prevention for high-dose events. If the SC preventer is not robustness, (i.e., it provides only a limited frequency reduction), a second LOC might be desirable. - No change required.	